Surveillance Camera and Surveillance Camera Image Processing Method

BACKGROUND OF THE INVENTION

(a) Field of the Invention

The present invention relates to a surveillance monitoring camera and an image processing method of the monitoring camera. More specifically, the present invention relates to a surveillance monitoring camera which automatically stores an image signal and an image processing method of the monitoring camera.

(b) Description of the Related Art

A surveillance monitoring camera takes photographs of places where security or a guard is necessary in banks or public office buildings so that security or guarding is easily performed remotely.

The conventional surveillance monitoring camera system comprises a camera, a storage device that stores taken images, and a display device. Image transmission between the camera and the display device is performed by wire and in real-time, and once an image is displayed, the image disappears. Therefore, in order to store the image signal, a storage device for the image signal is necessary. A video cassette recorder (VCR) is chiefly used as such a storage device, and video tape is used as the storage media.

However, the conventional surveillance monitoring camera system has following problems.

As the camera is far from the storage device and since transmission lines are used to transmit the image signals in a conventional surveillance monitoring camera, the transmission lines, the storage device, and the storage media can easily be damaged by a person who desires to disable the camera system.

Since the monitoring camera does not have a built-in image signal storage device, in order to display image signals taken by the camera after the images are photographed, an additional image signal storage device is needed.

Since a central image signal storage device stores image signals

transmitted from a plurality of monitoring cameras in a conventional monitoring camera system, it is difficult to store all the image signals taken by all of the cameras. Therefore, in order to store all the image signals, each camera needs to have an image signal storage device.

Since the conventional surveillance camera system converts the image signal into an analog signal to be stored, it is difficult to configure a monitoring system that concurrently monitors in multiple locations.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a surveillance monitoring camera with a built-in image signal storing device and an image processing method of the monitoring camera.

In one aspect of the present invention, a monitoring camera comprises an image signal receiver receiving image signals and converting the image signals into electrical image signals and outputting the electrical image signals; an image signal decoder converting the electrical image signals output from the image signal receiver into digital signals and outputting the digital signals; an image signal compressor compressing the digital signals output from the image signal decoder and outputting the compressed digital image signals; a storage device storing the compressed digital image signals from the image signal compressor; and a controller controlling the conversion, compression, and storing of the image signals.

The camera further comprises a sensor that detects a change of conditions input from the image signal receiver or from external conditions.

The camera further comprises a communication interface that receives and transmits the image signals stored in the storage device and information on the movement and operation of the camera to/from a place remote from the camera according to the operation of the controller.

In other aspect of the present invention, an image processing method of a monitoring camera that receives image signals and converts the image signals into digital image signals comprises the steps of (a) receiving the image signals and converting the image signals into electrical image signals; (b) converting the electrical image signals into digital image signals; (c) compressing the digital

image signals; and (d) storing the compressed digital image signals in a storage device built into the monitoring camera.

The step (d) further comprises steps of (e) receiving the image signals only when a change in the conditions of the image or of external conditions is detected by a sensor; and (f) receiving and transmitting the image signals stored in the storage device and conditions and instructions of the operation of the monitoring camera from/to a place remote from the camera.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate an embodiment of the invention, and, together with the description, serve to explain the principles of the invention:

FIG. 1 is a block diagram of a surveillance monitoring camera according to a preferred embodiment of the present invention; and

FIG. 2 is a flow chart of a surveillance monitoring camera according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following detailed description, only the preferred embodiment of the invention has been shown and described, simply by way of illustration of the best mode contemplated by the inventor(s) of carrying out the invention. As will be realized, the invention is capable of modification in various obvious respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not restrictive.

FIG. 1 shows a block diagram of a monitoring camera according to a preferred embodiment of the present invention.

The monitoring camera comprises an image signal receiver 10, an image signal decoder 20, an image signal compressor 30, a controller 40, a storage device 50, a sensor 60, and a communication interface 70. The image signal decoder 20 is coupled to the image signal receiver 10, the image signal compressor 30 is coupled to the image signal decoder 20, the controller 40 is coupled to the image signal compressor 30, the sensor 60 is coupled to the controller 40, the storage device 50 is coupled to the controller 40, and the

communication interface 70 is coupled to the controller 40 and to the outside.

An operation of the monitoring camera and an image processing method of the monitoring camera will now be described referring to drawings.

The image signal receiver 10 receives image signals, that is, optical signals, and converts the optical signals into electrical signals to be output to the image signal decoder 20 in step S10. The output electrical signals are analog signals. A device that converts the optical signals into electrical signals, such as a charge coupled device (CCD), is used as the image signal receiver 10.

The image signal decoder 20 receives the analog electrical image signals from the image signal receiver 10 and converts them into digital signals in step S20.

The image signal compressor 30 compresses the digital signals output from the image signal decoder 20 using an image compression method in step S30. The image signal compression methods include a wavelet method, a joint photographic coding experts group (JPEG) method, a moving picture experts group (MPEG) method, and a fractal conversion method. The reason for compressing the digital image signals is to reduce the amount of data that the digital image signals and to improve the usage efficiency of the storage device 50 in the camera.

The storage device 50 is installed in the monitoring camera and stores the digital data compressed in the image signal compressor 30 in step S40. Since the storage device 50 is built into the camera, it is not necessary to install an external storage device such as the VCR. A hard disk drive (HDD), a compact disc recorder (CDR), a mini disk (MD), or a memory card can also be used as the storage device. When using the above-noted devices, the total volume of the camera does not greatly increase. Therefore, even when a problem occurs in the monitoring camera or the central managing system so that the image signals cannot be transmitted in real-time, since the image signals are stored in the storage device 50 in the camera, images taken during the malfunction of the system can still be displayed.

The sensor 60 checks the conditions of the places of which the pictures are taken. It is not efficient for the camera to continuously take photographs and

store the image signals. Hence, the sensor 60 detects movements of physical objects in those places which are under surveillance and reports the detection results to the controller 40. The controller 40 allows the camera to operate only when the sensor 60 detects the movements of physical objects.

The controller 40 controls the conversion operation of the image signals of the image signal receiver 10 into the electrical signals, conversion operation of the signals of the image signal decoder 20 into the digital signals, and compression operation of the image signal compressor 30. Additionally, according to the information on areas under surveillance detected by the sensor 60, the controller 40 determines whether to store and receive the image signals provided to the image signal receiver 10, and controls the operation of the camera as well as the operation of receiving and transmitting the image signals taken by the camera through the communication interface 70.

Since the surveillance monitoring camera of the present embodiment comprises a built-in storage device and a controller, it is easy for each camera to have a set time, interval, and conditions for the storage of the image signals.

The communication interface 70, that is, a central managing device for the control of the operations of each camera, transmits information on the operations of the surveillance monitoring camera and image signals taken by the camera. Therefore, a person who manages the monitoring camera can always check for any malfunction of the camera or a communication failure. The monitoring camera can be connected to a local-area network (LAN) or a wide-area network (WAN) through an Ethernet system, a modulator/demodulator (MODEM), or a radio frequency (RF) transceiver. Since the monitoring camera converts the image signals taken into digital image signals and compresses and stores the digital signals, it is easy to transmit and receive the image signals and to configure a network system for managing multiple monitoring cameras.

While this invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.